

Attachment 6

Monitoring, Assessment, and Performance Measures

Describe the performance measures that will be used to quantify and verify project performance. Provide a discussion of the monitoring system to be used to verify project performance with respect to the project benefits or objectives identified in the Proposal. Indicate where the data will be collected and the types of analyses to be used. Include a discussion of how monitoring data will be used to measure the performance in meeting the overall goals and objectives of the IRWM Plan.

The performance measures used to quantify and verify project performance of the San Ramon Canyon Stormwater Flood Reduction Project are fourfold (also see Table 1 below):

- 1) ***Reduce the amount and speed of erosion to the canyon wall located below the upper PVDE switchbacks.*** Currently, the lower switchback of PVDE is a mere 86 feet from the top of the canyon wall. If the canyon erodes to within 35 feet of PVDE, the lower switchback will be in peril per the Project Study Report. It is estimated that the canyon has been eroding at five feet per year, which suggests that the lower switchback will collapse in seven to eight years (allowing for drought years). Reconstruction to replace both switchbacks would need to take place in 2019 and would cost approximately \$17,386,925. To monitor progress after completion of the project, several slope monitoring monuments will be installed to periodically monitor the land movement within the San Ramon Canyon. They will be installed as deep as 10-feet in some locations to make sure they reach bedrock or the solid equivalent. A tripod auger rig will drill a 12-inch diameter hole to a depth of up to 10-feet and a 6-inch PVC sleeve will be installed with a fixed survey rod cemented in the center. This would have an access cover that can be removed to enable periodic GPS survey readings. These monuments will be surveyed periodically using GPS methods that are tied into the existing City GIS system and control networks. The first survey will be done to establish the baseline position of each monument from which all future measurements will be referenced. The frequency of subsequent surveys will be as often as every six months, depending on the movement noted and could be isolated to chosen specific locations where movement is noted on a more frequent basis. The goal will be to observe no new erosion, thereby maintaining the current 85-foot width between canyon wall and lower switchback. The City estimates that the project will restore and stabilize approximately 10 acres, which include the canyon walls on both sides of the streambed, protecting against further slope failure. Stabilization of the slopes will reduce erosion at this location and will actually help improve water quality, a key GLAC IRWMP goal, by minimizing the erosion and debris transport that would occur, allowing “clear water” to flow to the exiting storm drain, and ultimately to the ocean.
- 2) ***Reduce the amount of clean-up costs of PVDS/25th Street by the City of Rancho Palos Verdes and City of City of Los Angeles.*** The City of Rancho Palos Verdes and the City of Los Angeles have worked together to share the costs of road cleanup after each rain event. On average the Cities have spent a combined \$165,000+ to clean up the road each year. The goal will be to incur no clean-up costs associated with PVDS/25th Street after completion of the project. This will be measured by City personnel, who will review any new clean-up costs associated with this location every six months. This meets with the GLAC IRWMP goal of maintaining and enhancing public infrastructure related to flood protection. Rather than allocating funds to clean-up runoff, these cities can now allocate these funds to prevent future flooding.

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- 3) ***Reduce the number of road closures due to rain events each year.*** In a typical rain year, 25th Street/PVDS, a principal arterial roadway, has been closed an average of three to four times per year for clean up. Over 700 cubic yards, or 910 tons of sediment and debris is removed from this location each year during these closures. The closures severely restrict access to the area for residents and emergency personnel, and reduce visitor access to several world-class resorts such as Trump National Golf Course and the five-star Terranea Resort. The inconvenience and loss of business can be significant. The City's goal is to reduce the number of road closures due to rain events to zero. This will be measured by City personnel, who will regularly review any road closures associated with this location. This goal will meet with the GLAC IRWMP goal of enhancing open space and recreation by reducing periodic congestion and rerouting of traffic, creating a better quality of life for residents and visitors to the area.
- 4) ***Protect, Restore and Enhance Natural Habitat*** – The proposed project will enhance open space and recreation by restoring the natural area down stream of the mid-canyon inlet structure, which is approximately 1.61 acres. Anticipating CEQA requirements, habitat will actually be restored to three times the acreage, or 4.83 acres. Re-vegetation of the streambed and affected canyon slopes with native vegetation will be conducted. Re-vegetation activity will include a plant palette, consistent with the Resource Agency and Native Plant Society criteria, that lists exact species of plants to be restored and the native plants to be used derived from local genetic sources. The City will also restore and improve the casual trail that exists from PVDS to the bluff top (approximately 1,700 ft. x 20 ft = 34,000 sq. ft.), creating a “gateway” to this open space parcel. The trail will lead from the roadside parking area to the bluffs overlooking the ocean and provide access to informal bluff trails to the beach. The City is also in the process of evaluating the development of a trail through the project area to connect Shoreline Park with Friendship Park. This activity will be measured at the conclusion of construction by City personnel who will visually confirm/measure acreage restored, plants used, and that 34,000 sq. ft. of trail was created. The goal to protect, restore and enhance natural habitat will also meet with the GLAC IRWMP goal of enhancing open space and recreation by restoring natural habitats and enhancing new trails for public use.

Project Performance Measures					
Table 1					
<u>Project Goals</u>	<u>Desired Outcomes</u>	<u>Output Indicators</u>	<u>Outcome Indicators</u>	<u>Measurement Tools & Methods</u>	<u>Targets</u>
1) Reduction of erosion rate of canyon wall below upper PVDE switchbacks. <ul style="list-style-type: none"> - Area to be stabilized: approx. 10 acres. - Assumed erosion rate of 5' per year, per the Project Study Report. - However, if canyon erodes another 35'; lower switchback is in peril. - Substantial collapse of the lower switchback is estimated to be 7 years (5' per year x 7 years = 35'). - Analysis pushed to 8 years to allow for drought years. - Reconstruction of both switchbacks in 2019 - total cost: \$17,386,925. 	Stabilization of canyon walls.	Construction of a mid-canyon Inlet structure, located slightly upstream of the upper PVDE switchback. Inlet structure will be connected to the ocean with a 3,900-foot-long, 54-inch pipe in a "tunnel alignment" that outlets below the oceanfront bluffs. Completion of construction anticipated to be April 2014.	Reduced rate of erosion.	Measurement of the width of slope between canyon wall and PVDE switchback using survey monuments and GPS methods as often as every six months.	0 feet of slope erosion each year.
2) Reduction in clean-up costs of PVDS/25th Street by the City of Rancho Palos Verdes and City of City of Los Angeles. <ul style="list-style-type: none"> - Cost of CLA clean up = \$28,625 per event X 3 events = \$85,875 per year. - Cost of RPV clean up = \$5,000 1x/yr; \$30,000 2x/yr; and \$15,000 of staff time per year. Total = \$80,000. - Total yearly cleanup costs: \$165,875. 	0 dollars spent in road clean up.	Construction of a mid-canyon Inlet structure, located slightly upstream of the upper PVDE switchback. Inlet structure will be connected to the ocean with a 3,900-foot-long, 54-inch pipe in a "tunnel alignment" that outlets below the oceanfront bluffs. Completion anticipated April 2014.	Fewer number of clean ups required.	Review number of clean ups required.	0 dollars in clean-up costs incurred each year.

Project Performance Measures Table 1 (Continued)					
<u>Project Goals</u>	<u>Desired Outcomes</u>	<u>Output Indicators</u>	<u>Outcome Indicators</u>	<u>Measurement Tools & Methods</u>	<u>Targets</u>
3) Reduction of road closures due to rain events each year. <ul style="list-style-type: none"> - Currently averaging three to four road closures per year. - Sediment removal during these closures averages 700 cu. yds. or 910 tons per year. 	0 road closures.	Construction of a mid-canyon Inlet structure, located slightly upstream of the upper PVDE switchback. Inlet structure will be connected to the ocean with a 3,900-foot-long, 54-inch pipe in a “tunnel alignment” that outlets below the oceanfront bluffs. Completion anticipated April 2014.	Fewer number of road closures.	Review of number of road closures.	No road closures each year.
4) Protection, Restoration and Enhancement of Natural Habitat. <ul style="list-style-type: none"> - Acres of habitat to be restored: Approximately 4.83 acres (1,750 sq. ft. x 40 sq. ft. X 3-anticipated CEQA requirement). - Area of trail to be enhanced: 34,000 sq. ft. (1,700 ft. long X 20 ft. wide). 	Replanted natural vegetation in construction site and enhancement of trail for public use.	Installation of gravity buttress in scoured canyon to restore streambed to historic elevation and provide erosion protection against undercutting. Installation of 1,700 ft. of buried pipe with enhanced trail incorporated into excavation restoration. Completion anticipated April 2014.	Re-vegetation of 4.83 acres of construction site and addition of 34,000 sq. ft. of trail.	Visual inspection that 4.83 acres of surrounding construction area was replanted and that 34,000 sq. ft. of trail was constructed for public use.	Re-vegetation of construction site and addition of trail.